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IMPLEMENTATION PLAN FOR A CONVERGED POLAR-ORBITING ENVIRONMENTAL SATELLITE SYSTEM

Executive Summary

May 2, 1994

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EXECUTIVE SUMMARY

This report is in response to recommendations formulated by the Vice President's National Performance Review (NPR) and subsequent draft legislation (H.R. 3400) that directs the Departments of Commerce (DoC) and Defense (DoD) and the National Aeronautics and Space Administration (NASA) to develop a detailed implementation plan for converging the National Oceanic and Atmospheric Administration's (NOAA) Polar-orbiting Operational Environmental Satellite Program (POES) with DoD's Defense Meteorological Satellite Program (DMSP). It is also responsive to requests from Congressman George Brown and Senator James Exon for the three agencies to study convergence options.

This plan includes lessons learned from an investigation of other interagency programs. It addresses the structure of an integrated program office to include roles and responsibilities of each of the affected agencies. It also identifies mechanisms to ensure the converged program remains affordable while satisfying each agency's critical needs and discusses budgeting for the converged system. It identifies a constellation of three satellites as the means to accomplish the converged national program. The plan closes with a section on transition actions needed in the near term to fully define the converged program along with a proposed schedule for implementing those actions.

The full Implementation Plan can be found at Volume I (with attachments). Relevant classified amplifying text can be found in Volume II (classified SECRET). Results from the recently concluded triagency (DoC, DoD, NASA) convergence study are contained in Volume III (classified SECRET).

INTEGRATED PROGRAM OFFICE STRUCTURE

Instead of delegating program activities among participating agencies, an Integrated Program Office (IPO) approach is to be used to manage the planning, development, fabrication, and operations of the converged system. The IPO will report to an Under Secretary level Triagency Executive Committee (EXCOM) that will act as Board of Directors to provide overall review and guidance and ensure the converged program successfully meets cost, schedule and performance requirements.

The IPO will use triagency work teams under the guidance of a single System Program Director (SPD) as displayed in Figure E-l. NOAA will provide the System Program Director to reflect the inherently civil nature of the program. The SPD is responsible for the financial, programmatic and technical performance of the

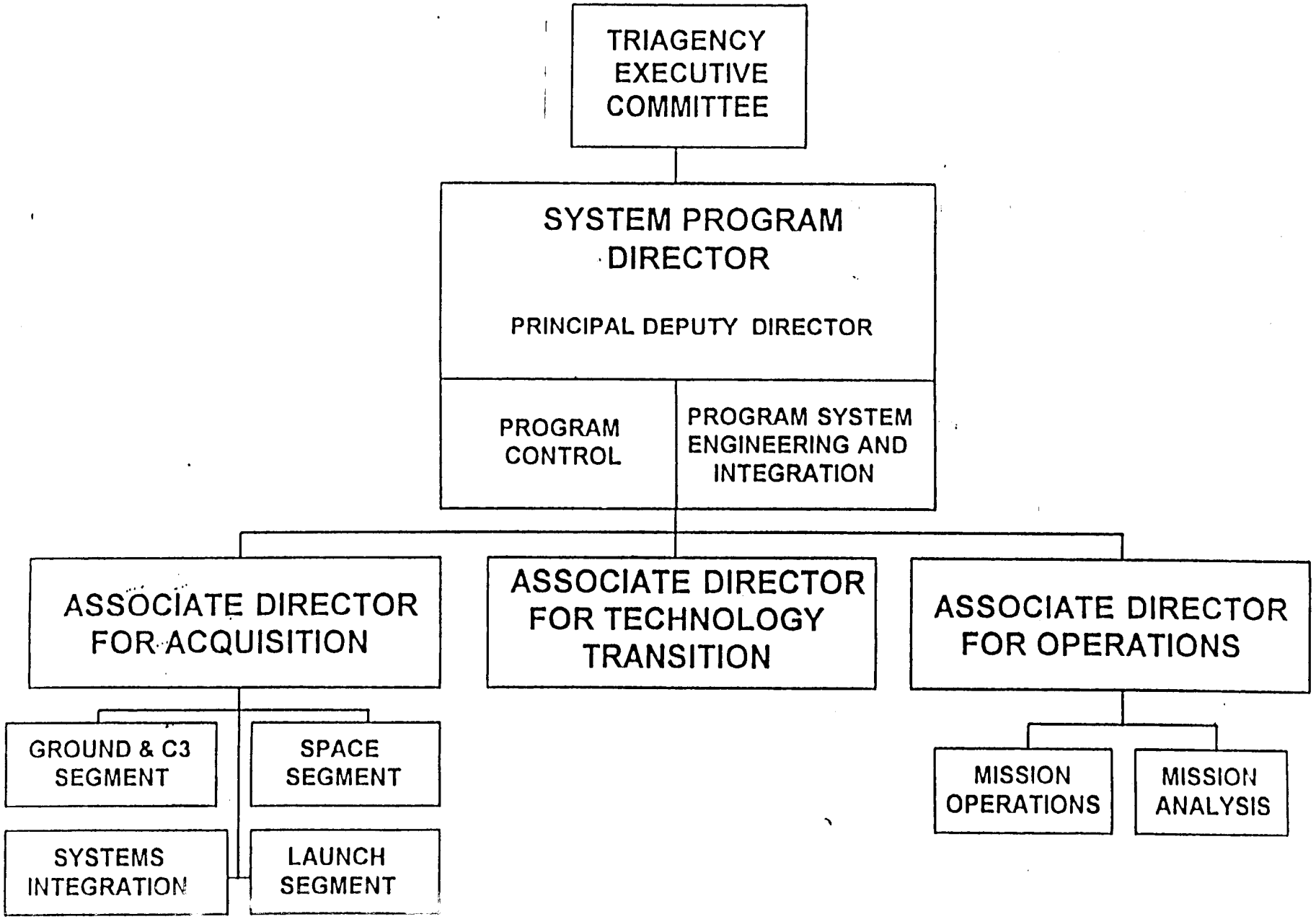


FIGURE E-1. INTEGRATED PROGRAM OFFICE FOR CONVERGED SYSTEM

program and will occupy a senior-level position that is at least equivalent in authority to an Assistant Administrator reporting to the Under Secretary of Commerce for Oceans and Atmospheres, an Associate Administrator reporting to the NASA Deputy Administrator, and a Director in DoD reporting to the Under Secretary of Defense for Acquisition and Technology. DoD will provide the Principal Deputy System Program Director, and the Associate Director for Acquisition; NOAA will provide the Associate Director for Operations; and NASA will provide the Associate Director for Technology Transition; all of which will report directly to the SPD.

While not a direct function of the IPO, the requirements validation and approval process for the converged program is integral to the IPO activities. A user-defined, validated set of operational requirements (patterned after the DoD process) is essential to the success of this joint agency program.

ARCHITECTURE

Only a few requirements drive the major facets of the system. These include: data collection timing; specific observational requirements, data dissemination requirements; and operational data delivery timelines. Given these requirements, the optimum converged constellation is three satellites in sun-synchronous orbits with even temporal spacing. The timing of these orbits would nominally be set at 0530, 0930, and 1330. This constellation provides data collection platforms at times where all agency data requirements can be met. NOAA will provide primary Command, Control, and Communications (C^3) with a combination of NOAA and Air Force Satellite Control Network assets providing command relay and data retrieval; DoD will provide an austere backup capability at Falcon Air Force Station. Elements of the ground segment architecture will be converged as early as 1999.

The system will be open in character. The system also has an important requirement to selectively deny real-time critical environmental data to an adversary during crisis or war, yet ensure the use of such data by U.S. and Allied military forces.

Due to significant differences in the nature of the research mission, as compared to the operational mission, the Earth Observing System-PM (EOS-PM) program needs to function independently from the operational mission. However, close coordination between the programs is required to ensure the research mission is only collecting data sets not included in the operational program. Certain NASA instruments, presently under development for EOS-PM1, offer possible additional operational capabilities for the converged spacecraft. Selection of these instruments for the converged system is dependent upon the results of the converged program's operational

requirements development process and the detailed trade analyses that are needed to determine the optimum instrument complements and spacecraft configuration for the converged system. Even if selected EOS-PM instruments are selected for use on the converged spacecraft, savings from this aspect of convergence are not expected to begin until after FY2000. The U.S. satellites in the converged operational program will have a common spacecraft bus; additional savings could potentially be realized if the converged spacecraft could use as much of the EOS common spacecraft as possible.

A critical aspect of the converged architecture is the role of the European METOP series of spacecraft. Maximum cost savings and benefits from international cooperation can be achieved if EUMETSAT is able to meet a set of U.S. conditions; for this reason, the working baseline assumption is that the converged constellation will include a European spacecraft. Recognizing the cost savings potential of this satellite and the benefits accruing to the U.S. government from international payload cooperation and data sharing, the task becomes one of satisfying the set of conditions that are required to meet all U.S. requirements, to include: operating the satellite at the 0930 equatorial crossing time; including U.S.-provided sensors to meet U.S. requirements; implementing U.S. data distribution policy, including the requirement to selectively deny critical environmental data to an adversary during crisis or war while allowing use of such data by U.S. and Allied military forces; and planning for and funding a launch-on-failure satellite replacement policy to ensure data continuity. Further detail can be found in Volume II.

--The NOAA and DoD operational missions share basic observational purposes; there are marked differences, however, in each agency's specific applications and system requirements. The result is a combination of instruments with similar missions but distinctly different specifications. The converged program office needs to perform detailed technical studies to determine the ability to satisfy similar agency requirements within a single instrument.

A significant aspect of establishing the converged system is determining how to transition from the current programs to the converged program. The preferred approach allows both agencies to fly out existing and programmed assets while immediately creating the IPO to develop and acquire the converged system. An alternative approach would be to modify existing satellites within the current inventory or under development. The triagency study concluded this latter approach was more expensive and of greater risk compared to flying out existing assets. Once the integrated operational requirements are validated by the agencies, an in-depth review of how best to use existing and programmed assets will be undertaken along with the detailed program studies which will result in the exact architecture for the converged system.

BUDGETING

The bulk of the expected savings will be achieved from converging the planned follow-on development programs in Defense (DMSP Block 6) and Commerce (NOM O,P,Q). Additional savings may be achieved by incorporating appropriate aspects of NASA's EOS Program, which will be studied over the next six months, No savings are available from existing or requested resources in FY 1994 and FY 1995. The greatest savings to be achieved through, convergence will be realized after FY 2000. Savings from the application of EOS-PM technology will not occur until after the initial flight of EOS-PM 1 in the post FY 2000 timeframe.

At the present time, a multi-agency approach to funding the converged system is the most practical alternative. As transition activities proceed, including the immediate and critical need to define and cost system requirements, a consolidated baseline will be established. This new baseline will incorporate annual potential savings achievable through convergence, and will be the basis for agency allocations for funding.

Over the next six months, the Administration will better define the 1996 through 1999 savings initially estimated in the National Performance Review. Agency's funding will be based on total program cost and common and unique requirements; Agency funding will be determined in the President's annual budget process with total program budget based on further definition of the integrated requirements, instrument complement, and system configuration.

While not proposed currently, single agency funding may be considered in the future since it removes the potential complications inherent in a multiple agency funding approach.

TRANSITION ACTIVITIES

Following (and depicted in Figure E-2) is a description of near term activities required to establish the converged program.

1. Establish National Policy OSTP will draft an Executive Order or Presidential Directive that must be signed to establish the overall need, objectives, fundamental precepts, and agency roles and responsibilities for the converged program.

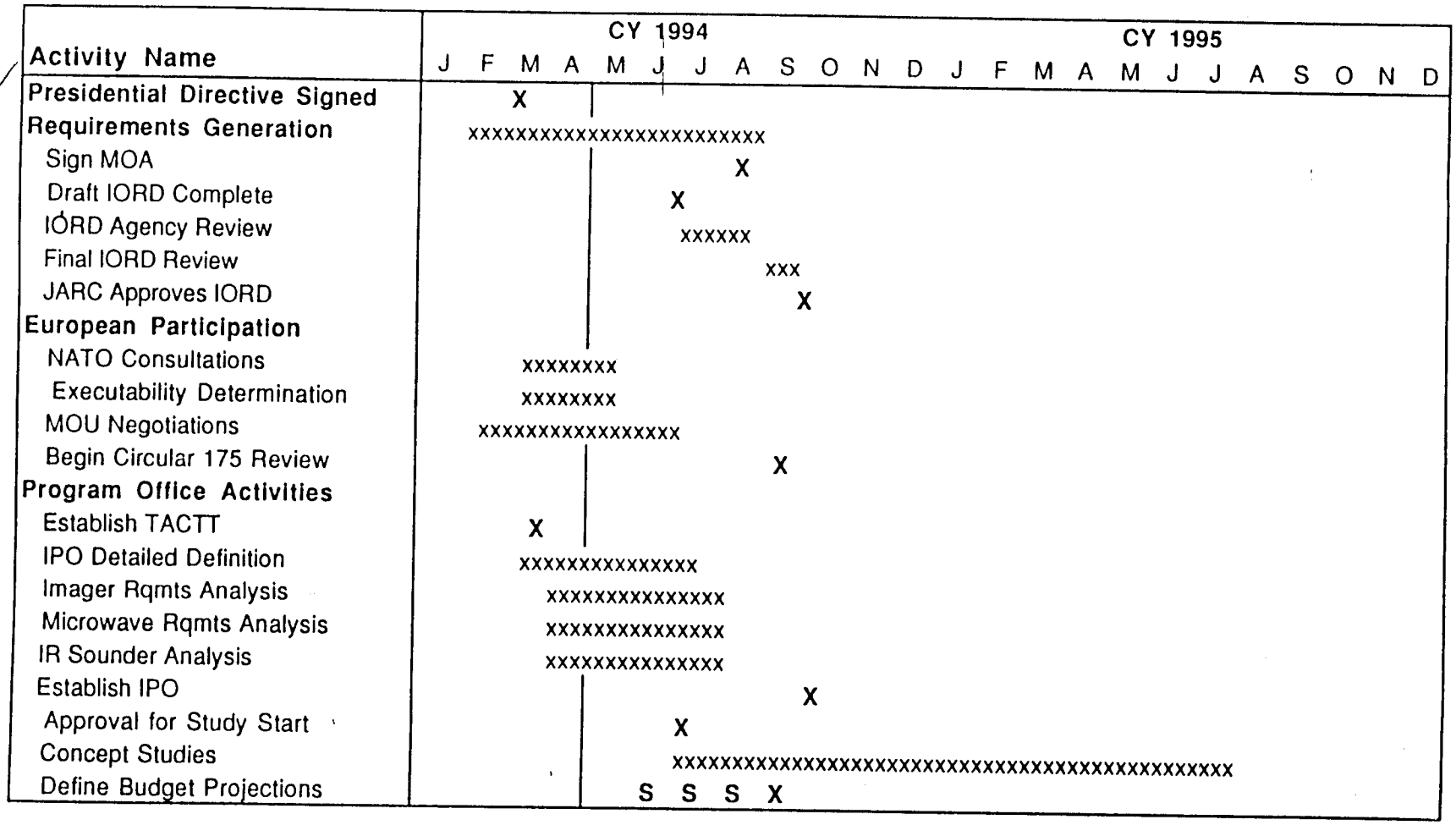
2. Establish the Intearated Program Office Major steps toward this end are triagency approval of a Memorandum of Agreement regarding

the responsibilities of the Integrated Program Office followed by establishment of the IPO.

(III) **Requirements** Triagency approval of a process for developing the requirements and development of the Integrated Operational Requirements Document.

(IV) Finalize **European Cooperation** Acrreements Key triagency activities are to address data distribution requirements with NATO; determine the executability of U.S. Government conditions for European involvement; modify draft European Organization for Exploitation of Meteorological Satellites (EUMETSAT) Agreement with convergence changes (as required), and finalize the EUMETSAT Agreement and any other necessary government-to-government agreements relating to the details of European participation.

FIGURE E-2. TRANSITION ACTIVITIES



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IMPLEMENTATIONPLAN
FOR A
CONVERGEDPOLAR-ORBITING
ENVIRONMENTALSATELLITESYSTEM

May2, 1994

I. INTRODUCTION

This report is in response to recommendations formulated by the Vice President's National Performance Review (NPR) and subsequent draft legislation (H.R. 3400) that directs the Departments of Commerce (DoC) and Defense (DoD) and the National Aeronautics and Space Administration (NASA) to develop a detailed implementation plan for converging the National Oceanic and Atmospheric Administration's (NOAA) Polar-orbiting Operational. Environmental Satellite Program (POES) with DoD's Defense Meteorological Satellite Program (DMSP). It is also responsive to requests from Congressman George Brown and Senator James Exon for the three agencies to study convergence options.

This plan addresses the structure of an integrated program office, proposes a management plan for the integrated program office (including roles and responsibilities of each of the affected agencies), and describes the steps needed to implement the recommended integrated program office structure. It also identifies mechanisms to ensure the converged program remains affordable while satisfying each agency's critical needs for assured access to remotely sensed atmospheric, oceanographic and space environmental data and discusses budgeting for the converged system. The plan closes with a section on transition actions needed in the near term to begin to fully define the converged program along with a proposed schedule for implementing those actions.

-BACKGROUND

On eight occasions since 1972, DoD and NOAA have studied convergence and implemented methods to increase coordination and avoid unnecessary duplication in their respective operational polar-orbiting environmental satellite programs. As a result, the DMSP and POES programs use a similar spacecraft bus employing many common structural components and subsystems, use the same launch vehicle, divide ground data processing duties, provide complementary environmental data to the nation, and work together on research and development efforts. However, there have always been fundamental differences in DoD and NOAA requirements as well as policy constraints that precluded total convergence.

In February 1994, DoC, DoD, and NASA completed a study to identify realistic opportunities for additional cost savings through further integration of all or parts of the DoD and NOAA operational polar-orbiting environmental satellite programs while capitalizing on NASA's EOS-PM technologies. Senior oversight of the study was provided by a Triagency Steering Committee (TSC)

composed of the NOAA Chief Scientist; the **Director**, Strategic and Space Systems, Office of the Under Secretary of Defense (Acquisition and Technology); and NASA's Deputy Associate Administrator for Mission to Planet Earth.

The most significant result of the study was an agreement to develop a converged operational polar-orbiting environmental satellite system with a transition period beginning immediately leading to a fully converged system by **2004--if** not sooner. In the process, many previous obstacles to full **DoD/NOAA** convergence have been resolved. Study results, in their entirety, are contained in Vol III (classified) of this Implementation Plan.

In addition to the results of the triagency study, the plan draws heavily on lessons learned from an investigation of other interagency programs. Management structures, requirement validation, documentation and processing and funding strategies for several joint programs, including the **LANDSAT-7** program, were all reviewed. The most significant lessons learned were incorporated into this implementation plan. Specifically, the following are necessary conditions for a successful interagency program:

- Each of the agencies involved in the program must be institutionally committed to its success

- There must be a single program manager with the authority and responsibility to manage all converged system activities across agency boundaries

- Collocating representatives from all the stakeholder agencies into an integrated program office under the direction of a single converged system manager greatly increases the chances for success

- Increased joint involvement of agency participants in day-to-day activities and problem solving within a single organizational structure increases coordination and chances for success

- The requirements baseline must be defined before the acquisition begins; that baseline must be configuration-controlled and any changes to the baseline must be made only after careful consideration by senior leaders in the agencies involved

- All funds for the program should be managed and defended by the Integrated Program Office.

II. MANAGEMENT

The Department of Defense and the NOAA/NASA team have been successfully managing their respective operational polar meteorological satellite programs since the 1960s. However, in overcoming significant programmatic challenges (e.g. schedule slips, on-orbit problems, cost overruns, and evolving user requirements), each group has used different approaches and processes which were best suited to their respective agency's working environment. One of the added challenges facing the converged program will be to develop working relationships that will merge these different approaches toward the achievement of a single combined set of objectives. It is therefore vital to establish an integrated management structure which capitalizes upon the strengths of all the agencies involved and allows close coordination between them in the execution of the program to provide the greatest opportunity to succeed.

GENERAL CONCEPT

An Integrated Program Office (IPO) approach will be used to manage the planning, development, fabrication, and operations of the converged system. The integrated approach maximizes use of the technical expertise provided by the participating agencies under a single System Program Director who will provide a coordinated programmatic focus. Each of the agencies involved in the converged program have somewhat different environmental monitoring requirements along with the associated specialized technical expertise necessary to achieve these objectives. To effectively develop a converged system that will be able to meet a set of combined agency requirements, the program will need to apply the specialized expertise of the participating agencies while still ensuring overall program effectiveness through a single point of authority. The involvement of the participating agencies in the day-to-day working of the converged program ensures the best technical expertise is applied directly to the program and promotes increased coordination among the triagency participants.

A range of approaches was studied to formulate a management model for the converged program that would capitalize on the specialized expertise of the participating agencies. Four different program approaches (Single Agency, Dual/Distributed, Integrated and new Government Corporation) emerged from the experiences of existing and previous programs. Three of these typical interagency/joint program approaches were considered ineffective and potentially detrimental to achieving converged program objectives in an interagency work environment. Centralizing all system implementation responsibilities through

the Single Agency Approach would limit the ready and immediate application of specialized expertise from other agencies. Dividing the program into discrete elements within multiple agencies, each with its own structural hierarchy (Dual or Distributed Approach), would maximize the direct application of relevant specialized expertise but also maximize the probability of uncoordinated decisions and activities. Program elements would tend to act more as individual entities than parts of a whole. Creating a new agency or government corporation would involve an unacceptable delay to establish the organization and develop its processes and procedures.

The Integrated Program Office (IPO) approach will avoid many of the difficulties of past joint program efforts. Many of the problems encountered in managing interagency programs are due in part to the division of major program activities among participating agencies and the lack of a central manager who has the authority and responsibility to manage programmatic activities located within the participating agencies. This separation of program activities into the individual agencies is believed to play a role in hindering coordination. Therefore in designing the IPO, personnel from the participating agencies will be combined and collocated, as appropriate, to promote a triagency team, rather than dividing programmatic activities among the participants. In this way, not only will the appropriate technical expertise be applied to each problem, but program coordination will be facilitated with a potentially greater overall acceptance of resulting decisions.

The IPO will use integrated work teams throughout the converged program under the guidance of a single System Program Director (SPD), and a set of Associate Directors, each of which will guide a particular functional area, as displayed in Figure 1.

The System Program Director will be nominated by NOAA and approved by the Triagency Executive Committee (EXCOM); the Associate Directors will be nominated by the appropriate participating agency and approved by the SPD. An Under Secretary-level EXCOM will act as the Board of Directors for the program. The EXCOM will meet at least annually (or at the request of any EXCOM member) to provide policy guidance; ensure sustained agency support (to include funding); and approve the management plan, budget, acquisition strategy, operations concept, baselines (e.g., cost, schedule and performance, etc) and major changes to the program baseline as proposed by the System Program Director. They will also review the annual business plan which will include national and international cooperative efforts and performance status. The EXCOM will ensure the System Program Director

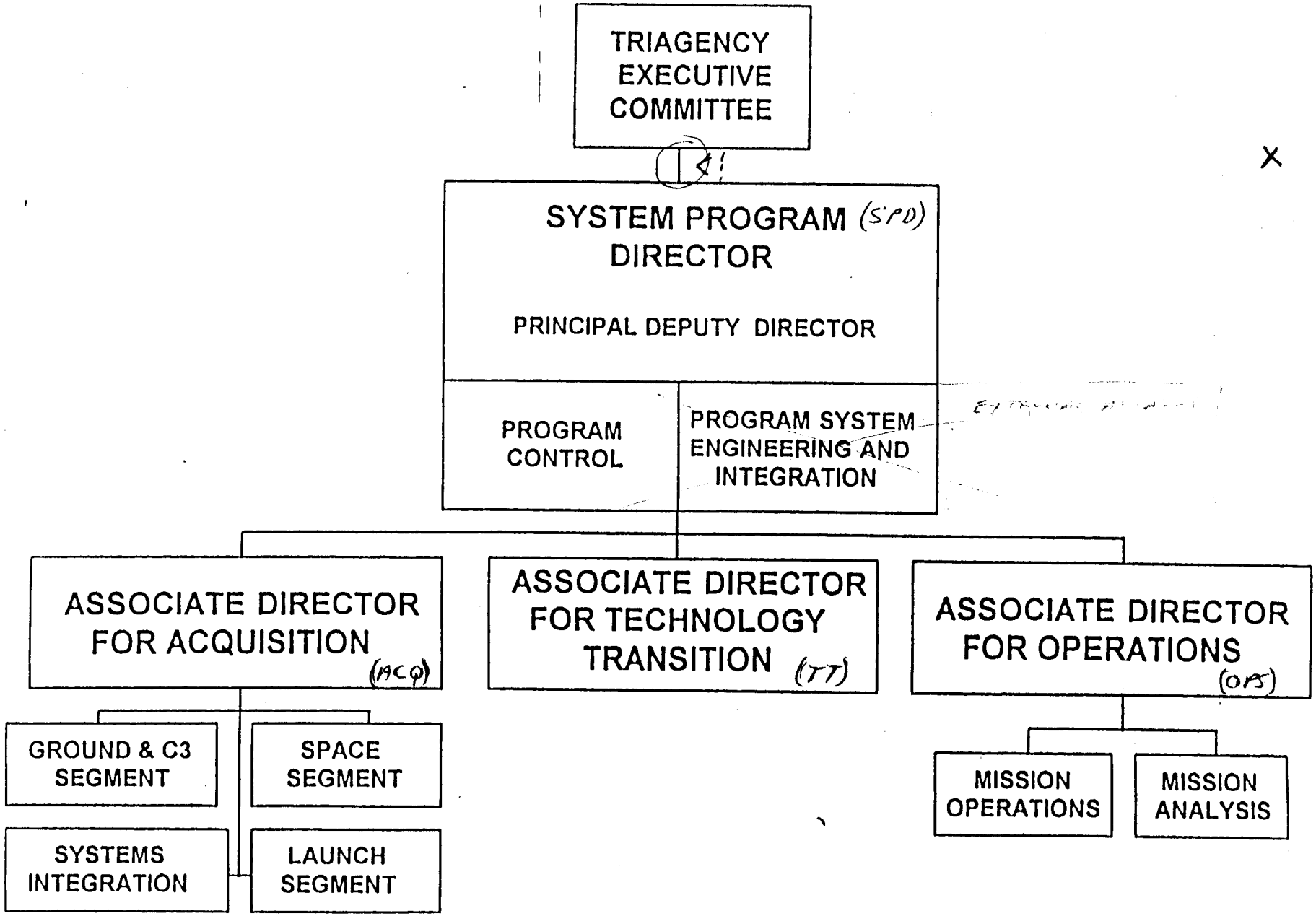


FIGURE 1. INTEGRATED PROGRAM OFFICE FOR CONVERGED SYSTEM

adequately satisfies each agency's requirements and is meeting cost, schedule and performance objectives.

To ensure joint involvement of the participating agencies in the converged program, each agency is to provide the expertise for a lead role in one or more of the four major functional areas (System Program Director, Acquisition, Technology Transition, Operations), and will provide technical personnel to all program areas. It is important to note that a lead role does not mean the total delegation of the activity to a single agency. It means that the agency with the lead will provide the Associate Director and core personnel which Will form a triagency team in performing the function using appropriate agency policies, procedures and statutory authorities (with modifications approved by the System Program Director as appropriate), and be responsible to the System Program Director. In addition, the people assigned to these leadership roles will be dedicated full-time to the program and not have continuing responsibilities for other programs or activities in their home agency. While the IPO will have sufficient personnel to accomplish the functions required for successful execution, there will be some support provided by agency staffs external to the .IPO.

This integrated approach will help promote an environment where the program personnel from the participating agencies are more focused on achieving the success of the overall converged system, considering the combined interests of the agencies involved, rather than focusing on a single agency perspective. It will also place the participating agencies *in* a closer working relationship with each other, where the agencies perceive it is more valuable to work together for a solution that maintains the converged system than pursuing an individual agency solution.

MAJOR FUNCTIONS WITHIN THE IPO

The four major functions (Management, Acquisition, Operations, and Technology Transition) included in the converged system integrated program office are defined as follows:

Management: the overall program accountability, guidance, coordination, direction, and responsibility for ensuring the program effort satisfies the requirements as defined in the Integrated Operational Requirements Document (IORD) in a cost effective manner.

Acquisition: the process of defining, developing, and procuring the system capabilities necessary to meet program requirements and objectives to include supporting research and technology.

- Operations: the command, control, and communications of the spacecraft system following launch, ensuring the data necessary for satisfying requirements and achieving the total program objectives is made available to the users.

  Technology transition: the process of finding, evaluating, and promoting the transition of new emerging technologies to the converged system to improve its operational capability, or to simultaneously meet operational and research objectives

System Program Director (Management) The System Program Director (SPD) is responsible for providing the overall direction of the converged program and its elements, to achieve program objectives. The System Program Director is responsible for the financial, programmatic, and technical performance of the program, leads and directs all management functions (including the formal interface with any international partners), centrally controls the distribution of all resources throughout the program, has final approval authority over all contract actions, and ensures effective overall program level system engineering, integration, and program control. As needed, the System Program Director will provide technical and cost feasibility analyses to the Joint Agency Requirements Group and advice to the.Joint Agency Requirements Council on issues regarding the converged program's financial and technical capabilities to meet observational requirements that are under review for possible addition to the Integrated Operational Requirements Document. In performing these functions, the SPD is responsible for developing (for EXCOM approval) the program's management plan, budget, operations concept, and any proposed major changes to the program baseline. In agreement with applicable OMB and Congressional authorities, the SPD will develop tailored funding and accounting structures for the converged program to allow for the greatest amount of usefulness in managing and controlling the program's resources.

The System Program Director has management authority (including the individual's performance plans/effectiveness reports) over the Associate Directors and their personnel, and is responsible for selecting a Principal Deputy (from DoD), and the Associate Directors from candidate(s) nominated by the appropriate participating agency.

The System Program Director's office will include triagency-staffed Program Control and Systems Engineering and Integration Divisions, along with an External Affairs function. The Program Control Division will be responsible for ensuring control,

continuity, and traceability of program-level schedules, budgets, system configurations, and plans used by elements throughout the converged program. The Systems Engineering and Integration (SE&I) Division will be responsible for ensuring system-level coordination of engineering activities across the program. The SE&I division will also serve as the IPO's primary interface with the JARG and JARC for technical evaluation and control of system requirements. The External Affairs function will assist in the development and coordination of activities that ensure the converged program effectively interacts with related organizations that are outside the IPO.

The System Program Director will be an employee of NOAA reflecting the inherently civil nature of the program and to provide the formal programmatic interface with international partners and users. Inherent in this overall management function is the responsibility to ensure the program execution of the U.S. policies (within the new constraints of the single converged U.S. meteorological polar orbiting satellite system) of open civil distribution of meteorological data and products for the global community.

The System Program Director will be located at a management level reporting directly to the Under Secretary of Commerce for Oceans and Atmosphere/NOAA Administrator. This senior position recognizes the significance of this joint civil-military effort and allows the SPD access to senior management at all three participating agencies to efficiently resolve issues affecting multiple agencies. In addition to the SPD's formal position in DoC, the SPD should have authority, regarding issues affecting the converged program, within the other participating agencies at a level equivalent to that of an Associate Administrator reporting to the NASA Deputy Administrator and a Director in DoD reporting to the Under Secretary of Defense for Acquisition and Technology.

All interactions with Congress relevant to convergence by the three agencies will be either coordinated with or directed by the SPD. While the Executive Committee will be available to help arbitrate interagency policy issues, the SPD would have sufficient seniority to resolve the day-to-day details of any critical interagency issues.

(4) **Associate Director For Acquisition** The Associate Director for Acquisition is directly responsible to the System Program Director for acquisition (to include test and evaluation) and installation of the space, ground, and command, control, and communication (C^3) segments. The Associate Director for Acquisition is also responsible for launch and on-orbit checkout

of the U.S. government spacecraft. Staffed by triagency personnel, the acquisition activity will also include divisions specializing in ground and C^3 segment acquisition and installation; space segment development and integration, launch services, and systems integration, including requirements analysis, milestone preparations, configuration management, and interface definition and control.

The Associate Director for Acquisition is responsible to the SPD for developing and fabricating a materiel solution to the program requirements identified in the IORD. This will be especially critical for developing the Space Segment, and developing/upgrading the C^3 and Ground User Segments for the converged program. A triagency team will be essential to ensure the appropriate technical expertise is available to develop solutions for requirements in the IORD that originated from the program's different participating agencies.

In concert with the Associate Director for Technology Transition, the Associate Director for Acquisition will also provide, as needed, accommodation studies to determine the potential impact upon system resources (technical and financial) of new technologies being evaluated by the Associate Director for Technology Transition for use in expanding the present capabilities of the converged system. Following SPD approval of proposed new technology applications to the converged system, the Associate Director for Acquisition will be responsible for developing, fabricating, and integrating technology applications onto the converged system.

DoD will provide the Associate Director for Acquisition based on its previous experience in acquiring complex systems and in particular, DMSP satellites. The Associate Director for Acquisition will execute the EXCOM-approved program baseline, under the management authority and guidance of the System Program Director, using the DoD acquisition procedures and infrastructure under the statutory authorities of the Defense Acquisition Executive (Under Secretary of Defense for Acquisition and Technology who is also the DoD member of the EXCOM). The SPD and the EXCOM will be key participants in the acquisition process. The SPD will function in a role equivalent to a DoD Component Acquisition Executive and EXCOM members will concur on all significant convergence-related decisions. The DoD procedures for use by this triagency program will be defined in more detail during the transition phase of the program by the SPD and Associate Director for Acquisition, with subsequent review and concurrence by the EXCOM, and approval by the Defense Acquisition Executive.

(III) Associate Director For Onerations The Associate Director for Operations is directly responsible to the System Program Director for operation of the converged system. It will be the responsibility of this function to ensure that data are supplied to the system's users for further specialized data processing. Within this function, divisions will work in further detail **such** issues as Mission Analysis, including the development of user interfaces and analysis of the data products to ensure that the converged system is capable of delivering its data, and Mission Operations which includes command and control operations, data retrieval, ground pre-processing, and distribution.

The IPO will not be responsible for producing final data products; instead, this will remain the responsibility of the agency's product centers (e.g. NESDIS; Air Force Global Weather Central, AFGWC; Fleet Numeric Oceanographic Center, FNOC). In this way the IPO can focus effectively on producing the data stream in a common format for all users. Any unique data processing requirements would be funded on a reimbursable basis by the requesting agency.

NOAA will provide the Associate Director for Operations, to present a civilian interface to national and international users and because of its experience in the operations of the NOAA civilian Polar-orbiting Operational Environmental Satellite (POES) and Geostationary Operational Environmental Satellites (GOES) programs. Along with the appropriate triagency personnel, NOAA will use NOAA and DoD facilities and supporting personnel in carrying out the converged system's operations requirements.

(IV) Associate Director For **Technology** Transition The Associate Director for Technology Transition is directly responsible to the System Program Director for promoting the transition of new technologies that could cost effectively increase the converged system's capability to efficiently meet its operational requirements, as defined in the Integrated Operational Requirements Document (IORD) (or science requirements approved by the JARC and contained in an addendum to the IORD). It is the responsibility of this Associate Director to work with all sources of potential new technologies (including NASA, Space Test Program, Advanced Research Projects Agency, DoD labs, NOAA, academia, and industry, etc.) to identify, evaluate and promote, new technologies through feasibility studies, proof-of-concept studies, and technology demonstration efforts. This activity will include proposing potential interagency working agreements for joint-product development efforts with mutual benefits to both partners at reduced cost to the U.S. Government. In concert with the Associate Director for Acquisition, who will provide the necessary accommodation studies to determine the impact of **new**

technology proposals upon system resources, the Associate Director for Technology Transition will present new technology proposals to the SPD ensuring that proposals are adequately defined, technically feasible, and useful for the satisfaction of operational requirements. In some cases this will necessitate conducting preliminary development activities associated with technology demonstration. Final approval of new technology proposals by the SPD will be dependent upon the proposal's ability to enhance system capabilities within the available financial and technical resources of the program and its systems.

Providing for a specialized technology transition function in the IPO allows the converged system to pursue two complementary activities. Therefore the Associate Director for Technology Transition can focus primarily on proposing for SPD approval the potential incorporation of new opportunities to expand system capabilities, while the Associate Director for Acquisition can focus primarily on the development of approved technologies and ensuring delivery of the approved system capability to orbit.

NASA will provide the Associate Director for Technology Transition based upon its experience and expertise in developing remote sensing technology and the EOS-PM mission, and its previous experience in developing the NOAA weather satellites,

INFRASTRUCTURE

The IPO will be created with its own organizational structure that crosses over present agency boundaries. As discussed earlier, it is essential that the senior IPO official.; be placed at a management level that is high enough in their respective agencies to facilitate interagency interaction.

The IPO is to be located outside of existing DoD DMSP, NASA Polar Metsat, NOAA System Acquisition Office, and National Environmental Satellite, Data, and Information Service (NESDIS) Polar Metsat program organizational structures so the new organization will begin to develop the joint program triagency perspective and team working relationships critical to the program's ultimate success. IPO positions may be filled from personnel from the acquisition and operational programs (e.g. DMSP Block 6 and NOAA-O,P,Q). Transfer of additional personnel from the existing program offices may occur over time, as responsibilities associated with the preparation and launching of the remaining non-converged program assets decrease. Collocation of IPO personnel is essential to promoting an integrated working environment that employs a triagency workforce. The degree of collocation of the IPO functions, to include personnel, will be

determined by the SPD in consultation with the Associate Directors and will be an integral element of the organization and management plan presented to the EXCOM for approval. Office space in presently existing government facilities will be considered for the IPO. DoD, NOM, and NASA must finalize an Interagency Relationships MOA and develop a plan to locate, activate, and assign personnel to the IPO. Triagency positions must be identified for each IPO Associate Director. and their staff, as well as the SPD's staff. The present DMSP and POES acquisition program offices will continue their present non-convergence acquisition activities to ensure the converged program's first flight readiness is achieved without impacting the successful provision of the remaining non-converged program assets (NOAA K-N' or DMSP 5D-3).

REQUIREMENTS VALIDATION AND APPROVAL

While not a direct function of the IPO, the requirements validation and approval process for the converged program is integral to the IPO activities. A user-defined, validated set of operational requirements is essential to the success of this joint agency program.

A procedure for assembling, evaluating and, prioritizing the requirements of the participating agencies (based on the DoD processes described in DoDI 5000.2) Will be used to establish the requirements for the converged program. Each agency will submit their validated requirements, developed from their user communities, through a Joint Agency Requirements Group (JARG) with NOAA, DoD, and NASA membership. The JARG is responsible for identifying the requirements as common versus unique as well as prioritizing the requirements as "key", "threshold", or "objective". An Integrated Operational Requirements Document (IORD) will e drafted and submitted to the Joint Agency Reauirements Council (JARC), also with NOAA, DoD, and NASA membership, for final approval. During the IORD approval process, cost considerations will be observed through JARG interaction with the IPO. The IPO (through the SE&I division) will address the program's ability to accommodate the proposed requirements within the system's allocated financial and technical resources. Science requirements that are associated with the transfer of an instrument from a platform outside of the converged system onto the converged system must be processed via an addendum to the IORD commensurate with their intended use on the converged system.

SCHEDULE FOR IMPLEMENTATION

In order to ensure adequate time for trade-off analyses, design, development, and build of the converged satellite system, a Triagency Adhoc Convergence Transition Team (TACTT) will be established immediately upon Administration approval of the Implementation Plan to develop the plan to activate the Integrated Program Office. Additionally, as a first order of business, the agencies will select the individuals to fill the key IPO positions. The TACTT will at least be composed of a cadre of experts in order to conduct those planning activities necessary to develop **MOA's,** locate the IPO, contract, as necessary, and further define detailed management and programmatic procedures. The TACTT will find a location to begin this work, which would include the following:

- determine personnel requirements; identify personnel that may be transferred to the IPO (e.g. DMSP Block 6 and NASA/NOAA O,P,Q personnel); prepare a plan for fully staffing the IPO; determine need for technical contractor support in critical areas

- assess feasibility and need for new/revised/modified procedures to ensure streamlined management and ensure effectiveness and accountability to US Government policy and regulations in a triagency environment

- determine which functions must be integral to the IPO and which functions should be provided by the agencies in support of the IPO; define functional interfaces and organizational relations necessary for the IPO to execute its responsibilities vis-a-vis the agencies; determine what **MOA's** are necessary between the SPD and other government agencies

- finalize triagency Memorandum of Agreement defining interagency relationships

- address what is necessary to initiate implementation of the triagency converged program without interfering with or impacting present activities to provide the remaining non-converged program assets (NOAA K-N' and DMSP-5D3)

In addition to the TACTT activities, the Triagency Steering Committee will immediately establish triagency teams to:

- finalize technical interface arrangements with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) consistent with the timeframe in which NOAA's negotiations of a formal EUMETSAT Agreement is completed

- evaluate and recommend which contracts and technical studies, including those presently underway, should be adopted for triagency use in support of defining and evaluating options for the converged system

- establish team to prepare proposals for (or oversee ongoing) preliminary technical studies and conduct in-house studies as applicable

- coordinate with the triagency activity addressing both the role of the EUMETSAT and the executability of the conditions to enable the role in the converged system

III. ARCHITECTURE

BACKGROUND

Currently, NOAA and DoD operate separate operational environmental satellite constellations, each consisting of two polar-orbiting satellites. A significant difference in these constellations is the satellite's local equatorial crossing time. NOAA's primary satellite is nominally placed into an orbit with a 1330 crossing time allowing timely collection of data for NOAA's global weather prediction models. NOAA's second satellite is placed into a 0730 orbit timed primarily to provide equal six hour gaps between satellite passes. In addition, NOAA has made an agreement in principal with the European consortium EUMETSAT allowing EUMETSAT to assume primary responsibility for the NOAA morning mission beginning in the year 2000. DoD's DMSP equatorial crossing times vary based on DoD support requirements. The nominal times for the last two launches were 0530 and 0730.

While years of close cooperation have produced many similarities in spacecraft hardware, the two programs are still operated independently. NOAA has a satellite operations center at Suitland, Maryland, with command relay, backup command generation, and data acquisition facilities at Wallops Island-Virginia, and Fairbanks, Alaska. DoD has a primary satellite operations center in Omaha, Nebraska, and a backup facility near Spokane, Washington. Command relay and data acquisition is accomplished through a number of sites around the world which are part of the Air Force Satellite Control Network.

In addition to these two operational programs, NASA has plans for a number of polar orbiting Earth Observing System (EOS) research satellites which will be making some remote sensing observations similar to those of the operational program. The portion of EOS of particular interest is the EOS-PM series which will have a local equatorial crossing time close to NOAA's 1330 satellite. This EOS-PM series will have separate command and control and data relay elements from the two operational programs.

This combined set of programs creates a currently planned architecture by the early 2000s consisting of two DoD satellite;, one NOAA satellite, one European satellite, and one NASA EOS-PM research satellite. These satellites would have three separate ground system infrastructures.

CONVERGED OPERATIONS CONCEPT

A key requirement to achieving a workable converged program is an adequate vision of the operations of the converged system. This vision includes appropriate on-orbit constellation, satellite operations facilities, and command and data readout antennas.

In order to meet all agency observational and system requirements, the minimum on-orbit system is three evenly spaced operational satellites, and a separate research satellite. The operational constellation would consist of satellites with nominal equatorial crossing times of 0530, 0930 and 1330. This converged operational program should have a consolidated operations center and optimum set of command and data acquisition sites for the U.S. satellites.

Due to significant differences in the nature of the research mission, as compared to the operational mission, the EOS-PM program needs to function independently from the operational missions. This would entail a separate research satellite on-orbit and separate ground control facilities. However, close coordination between the programs is required to avoid duplication of instruments, to allow for instrument development and transition to operational status, to improve operational measurement and algorithms, and to support non-operationally based research objectives. This ensures the research mission is only collecting data sets not included in the operational program. Various options involving the use of NASA EOS-PM technology were reviewed and included in the cadre of potential convergence configurations. Certain NASA instruments, presently under development for EOS-PM 1, offer possible additional operational capabilities for the converged spacecraft. These instruments could potentially have a dual role in providing not only information to help answer questions on global change research, but enhancing the capability of the converged system to meet its operational requirements. Therefore some of the instruments from the EOS-PM 2/3 could be transferred to the converged spacecraft, reducing the amount of flight hardware and total costs needed to conduct these missions. However, selection of these instruments for the converged system is dependent upon the results of the converged program's joint operational requirements formulation process and the IPO's detailed trade analyses that will be used to determine the optimum instrument complement and spacecraft configuration for the converged system. It would also be wise to allow for the continued developmental progress of these instruments for EOS-PM 1, presently planned for the FY 2000-2001 timeframe. Even if some EOS-PM instruments are selected for use on the converged spacecraft, savings from this

part of convergence is not expected to begin until after FY 2000. With this concept in hand, specific details of the converged system can be established.

ON-ORBIT CONSTELLATION

Requirement Drivers. There are a substantial number of observational and system requirements defining the converged system. However, only a few of these actually drive the major facets of the system. These requirement drivers are:

-NOAA sounding data collection timing

-DoD four hour global cloud cover refresh

-DoD surface wind and moisture data

-Operational data delivery timelines

In addition, although the system will be open in character, DOD requires the capability to selectively deny critical real-time environmental data to an adversary during crisis or war, yet ensure the sue of such data by U.S. and Allied military forces. Any decision to deny data would be made at the highest levels of the U.S. Government.

Given these requirements, the converged system details emerge.

Orbit Timing. The timing of the existing satellites are driven by each agency's highest priority data needs. For NOAA, collection of temperature and humidity profiles in the early afternoon (nominally 1330) is vital to provide timely inputs for NOAA's weather forecast models. DoD requires four hour global cloud cover updates with emphasis on early morning times. Currently the two DoD satellites provide the early morning data (nominally 0530 and 0830) and the NOAA satellites provide suppiementary data to achieve the required cloud cover updates. Given these requirements, the optimum converged constellation is three satellites in sun synchronous orbits with even temporal spacing. The timing of these orbits would nominally be set at 0530, 0930, and 1330. This constellation provides data collection platforms at times where all agency data requirements can be met.

Spacecraft. The challenge for the spacecraft definition is primarily economic. Currently, DoD, NOAA, and NASA have independent plans for new bus developments. This is the most obvious example of redundant spending plans within the existing programs and is the potential source of greatest near-term savings in the converged program. Clearly, the converged operational program will have only one spacecraft development allowing those savings to be achieved; however, additional savings could be accrued if the converged

operational program could use as much of the EOS PM spacecraft as possible to avoid any duplicate development. The extent to which a single design, development, fabrication, integration, assembly, and test flow can be realized, the greater the expected savings in cost and schedule. Feasibility of this approach is not obvious due to the differing instrument interface, **data handling, and** communica-tion requirements of the operational versus research spacecraft. The programs will require continued close coordination to pursue this potential source of savings.

With the need for a common spacecraft established, the next challenge is defining the size of that platform. Currently, both DoD and NOAA spacecraft are based on early 1970s technology and were originally designed for a Thor launch vehicle. The design has been expanded, updated, and requalified to be launched off an Atlas-E and then a Titan-II booster. The result is a spacecraft which is at its limit of capacity consisting of numerous out-of-date, system unique components. This spacecraft is inadequate to accomplish the operational environmental remote sensing mission of the 2000s. Based upon detailed efforts during DoD DMSP Block-6 and NOAA O,P,Q concept studies and recent analysis of converged system layouts, the converged system bus would be in the Medium Expendable Launch Vehicle Class.

Instruments. The NOAA and DoD operational missions are primarily meteorological in nature. As such, they share basic observational purposes--cloud/surface imaging and atmospheric sounding. There are marked differences, however, in each agency's specific applications and system requirements. The result is a combination of instruments with similar missions but distinctly different specifications. A short summary of each mission area follows:

Atmospheric Soundings. NOAA high resolution, quantitative sounding requirements drive the need for an infrared sounding instrument with supplemental microwave temperature and humidity sounding instruments. DOD sounding resolution requirements are lower than NOAA's resulting in reliance on microwave soundings only. In addition, DoD plans to combine existing microwave sounding instruments with a microwave imaging instrument accepting reduced quantitative sounding capability for coregistration of all microwave measurements. This forces a choice between microwave sounding approaches. The simplest approach would be to put NOAA's microwave sounders on the converged satellite and also incorporate DoD desired channels into the microwave imager. However, cost and integration complexity considerations may not allow this. The converged program office needs to perform a detailed technical study to determine the optimum implementation of the microwave sounding capability. Additionally, while NOAA's IR sounding requirement is clearly

understood, two types- of instruments can meet the requirement. A relatively small, interferometer instrument would meet operational requirements. However, NASA is developing an advanced infrared sounder to meet global climate change research objectives which also may meet operational meteorological requirements. Using this instrument on the operational satellite could reduce the amount of flight hardware to conduct both missions. A study of the integration and accommodation aspects of these instruments is required to determine optimal system configuration.

Visible/Infrared Imaging. DoD's primary imaging requirements are for global and regional measurements of cloud data. This translates into an instrument-to achieve nearly constant 0.5 kilometer resolution across the entire instrument scan. NOAA requires only 1 kilometer resolution data and allows the resolution to degrade to three kilometers at the edge of scan. NOAA, however, does have tighter spectral band and calibration requirements. These differences in imaging requirements are significant, as the instrument required to meet the combined set of requirements is technically complex, quite large, and potentially too expensive, Definition of the exact visible/infrared imager requires a detailed technical study to determine the cost and risk associated with satisfying requirements.

Microwave Imaging. DoD and NOAA requirements are both currently met by the instrument flown on DoD satellites. This capability will be retained on the converged system, with the instrument design being primarily driven by DoD requirements. Currently, NASA is planning to fly a microwave imager on its EOS-PM 2/3 spacecraft. If the operational program operates three satellites with microwave imagers providing data adequate for the global change program, a microwave imager may not be needed on the EOS-PM 2/3 satellites, allowing the remaining EOS-PM 2/3 instruments to fit on a smaller bus. This possibility requires further programmatic coordination, but would improve opportunity to achieve a common bus for the operational and research program.

Space Environmental Monitoring. Both DoD and NOAA operate a variety of space environmental monitoring instruments. These instruments are typically small and relatively inexpensive, and all data from the instruments are shared by the respective using communities. The set of space environmental monitoring instruments for the converged system will not have a major impact on total system design and specific sensors will be jointly defined and implemented on the converged system.

Other Instruments. A number of other instruments that are agency unique are included in the current and planned programs. These instruments (e.g., Search and Rescue) will continue to be the

primary responsibility of the individual agency. These payloads will also be included in the converged system.

Instrument Lifetime. The reliability of designated mission-critical sensors affects the satellite system lifetime. Failure of a mission-critical sensor requires launching a new satellite. Combining two operational programs with separate mission-critical sensors into a converged program results in shorter satellite expected on-orbit life. It is therefore imperative all sensors scheduled to fly on the converged system be designed for similar lifetimes.

EUROPEAN PARTICIPATION

A critical aspect of the converged architecture is the role of the European METOP series of spacecraft. This spacecraft is currently a part of NOAA's plans for future support. Maximum cost savings and benefits from international cooperation can be achieved if EUMETSAT is able to meet a set of U.S. conditions; for this reason, the working baseline assumption is that the converged constellation will include a European spacecraft.

EUMETSAT will build, integrate U.S.-provided instruments, launch and provide command and control for the METOP series beginning with the launch of a pre-operational satellite in late 2000. The second (and first operational) satellite is projected to be launched in 2005--approximately the same timeframe as the converged U.S. system. The Europeans plan to operate this satellite with a mid-morning equator crossing time. This would fit well with -our-needs for a 0930 satellite.

Recognizing the potential contributions of this satellite to the U.S. converged program, the task becomes one of determining how U.S. conditions can be met by EUMETSAT. The following conditions are critical for the United States:

- operate METOP satellite at the 0930 equator crossing time

- include U.S.-provided sensors on METOP to meet U.S. core requirements

- implement a U.S. data distribution policy, including the requirement to selectively deny critical environmental data to an adversary during crisis or war while allowing use of such data by U.S. and Allied military forces;

- adopt and fund a launch-on-failure satellite replacement policy to ensure data continuity

- acknowledge in an agreement to allow all U.S. Government agencies use of all data necessary to meet their requirements

- all agreements necessary to ensure these conditions can be executed in both the military and civilian international communities

The details for these requirements are provided in Volume II.

GROUND SEGMENT

NOAA and DoD will both have control centers with capability to perform all operational functions in the converged operational polar-orbiting environmental satellite C^3 system. NOAA's Satellite Operations Control Center (SOCC), will have primary responsibility for all C^5 functions except for military theater data access-. The DoD control center at Falcon Air Force Base Colorado will be an austere, but operationally capable, backup. The implementation of this concept will take a two phased approach.

During a transition period (1994-2004) steps will be implemented to decrease redundancies, foster greater commonality, and integrate operational procedures between all agencies. By 1997, the Air Force will close its Fairchild Satellite Operations Center (FSOC), Fairchild AFB, WA, and incorporate the capability to control existing DMSP satellites into the NOAA SOCC. This will provide NOAA and DoD operators the opportunity to familiarize themselves with joint-agency operations. During this time, primary DMSP operations will continue at the Multi-Purpose Satellite Operations Center (MPSOC), Offutt AFB, NE. After the NOAA SOCC capability to exercise control of the DMSP constellation has been validated in 1998, incremental mission transfer will occur to achieve primary DMSP/NOAA operations at the NOAA SOCC. Simultaneously, DoD will complete modifications to achieve a mission-capable austere back-up. This configuration will exist until primary mission operations for both programs are validated at the SOCC. The Air Force will then close MPSOC. The SOCC will have primary C^5 responsibility for both programs at that point in the transition period. The SOCC will assume primary responsibility for the converged program for the first converged satellite when it is launched. Net savings for C^3 will be realized as early as 1999 and will continue throughout the program life cycle (2000-2014).

As soon as feasible, NOAA operations will begin to use the DoD satellite control network for C^3 operations, with the goal of achieving full compatibility by 1998. The network will have the

capability for getting European data to worldwide users as required. The final converged ground system will use elements of the Air Force Satellite Control Network and the current NOAA command and data acquisition stations, as appropriate.

TIMING

A significant aspect of establishing the converged system is determining how to transition from the current programs to the converged program. NOAA has four satellites in production, and two more expected under contract in early 1994. DoD has four completed satellites and five more in production. In addition, NOAA is actively negotiating with EUMETSAT to have European spacecraft replace NOAA's current morning satellite beginning late in the year 2000. Given these assets (and allowing for the probability of failures), the need date for the first of the follow-on systems would be established by the date of the last launch of existing satellites. Based on planning activities of NOAA and DoD, which envision continuing to maintain two DoD DMSP orbits as long as currently programmed assets allow and two NOAA orbits until the European METOP satellite is launched, both agencies estimate this need date to be as early as 2004. Once the integrated operational requirements are validated by the agencies, an in-depth review of how best to use existing and programmed assets will be undertaken along with the detailed program studies which will result in the exact architecture for the converged system.

An alternative approach would be to modify existing satellites within the current inventory/production pipeline. Such "hybrid" converged satellites would have allowed a converged satellite constellation prior to 2004. However, in all cases, these options proved more expensive and of greater risk compared to flying out existing assets while establishing the converged system. Details of this trade-off study are in Volume III (classified).

The preferred approach allows both agencies to fly out existing and programmed assets while immediately creating a "national" Integrated Program Office (IPO) to develop and acquire the converged system. Given the projected life expectancies and the probable failure rate of these satellites, the converged system first satellite need date could be as early as 2004. Given the historical development and production timelines of the existing programs, the projected development and production time for the first converged satellite is ten years. The combination of need date and projected schedule demonstrates the need to begin this process immediately.

IV. BUDGETING OPTIONS

At the present time, a multi-agency approach to funding the converged system is the most practical alternative. As transition activities proceed, including the immediate and critical need to define and cost system requirements, a consolidated baseline will be established. This new baseline will incorporate annual potential savings achievable through convergence, and will be the basis for agency allocations for funding. All implementing actions will be accommodated within the overall resource and policy guidance of the President.

The Integrated Program Office will have primary responsibility for the development and justification of budget planning estimates. The Executive Committee will approve each annual budget request prior to submission to the President. The IPO budget planning process will be consistent with agencies' internal budget decision making process and schedule. Appropriated funds for the converged system will be administered through the IPO, and with the normal oversight responsibilities of affected agencies and the Executive Office of the President,

For the development of the fiscal year 1996 budget, the Departments of Commerce and Defense, and NASA, will provide convergence budget briefings to the Office of Management and Budget (OMB) and the Office of Science and Technology Policy on June 1, 1994, July 1, 1994, and August 1, 1994. A final report will be provided by September 9, 1994. The final report will be consistent with the budgets submitted to OMB by the agencies. These briefings and the reports are to include all costs and savings associated with convergence, including research and development, acquisition and deployment, operations, global data dissemination, and administration and personnel. The briefings and the reports will provide comprehensive program and budget information on existing systems, identifying how existing activities and funding will transition to the converged system, and on how convergence with NASA's Earth Observing System (EOS) can be accomplished.

Improved estimates of costs and savings will be developed as integrated program requirements are finalized and the instrument complement is defined. The following program management actions will facilitate this process:

- The Joint Agency Requirements Group (JARG) will develop the integrated set of program requirements. This charge is on-going.
- Preliminary system definition activities will be initiated by a triagency technical team formed by the Triagency Steering Committee (TSC).

- The Triagency Adhoc Convergence Transition Team (TACTT) will lead the activation of the Integrated Program Office. The IPO will continue the system configuration analyses and definition efforts begun by the system definition technical team.

The bulk of the expected savings will be achieved from converging the planned follow-on development programs in Defense (DMSP Block 6) and Commerce (NOM O,P,Q). Additional savings may be achieved by incorporating appropriate aspects of NASA's EOS Program, which will be studied over the next six months. No savings are available from existing or requested resources in FY 1994 and FY 1995. The greatest savings to be achieved through convergence will be realized after FY 2000. Savings from the application of EOS-PM technology will not occur until after the initial flight of EOS-PM 1 in the post FY 2000 timeframe._

Over the next six months, the Administration will better define the 1996 through 1999 savings initially estimated in the National Performance Review. Agency's funding will be based on total program cost and common and unique requirements. Agency funding will be determined in the President's annual budget process with total program budget based on further definition of the integrated requirements, instrument complement, and system configuration.

While not proposed currently, single agency funding may be considered in the future since it removes the potential complications inherent in a multiple agency funding approach.

V. TRANSITION ACTIVITIES

The date the first converged satellite is needed is defined by the projection of when the last of the current generation of NOM and DMSP satellites are launched. Figure 2 depicts the projected launch dates for these satellites.. Based on these data, the first of the converged satellites would be required in 2004 as a backup to NOAA N' in case of a failure, Laying in a projected acquisition schedule to achieve this availability date (Figure 3) demonstrates that activities need to begin immediately. Following (and summarized in Figure 4) is a description of near-term activities required to establish 'the converged program.

REQUIREMENTS

The fundamental basis of the converged system will be the agreed requirements for the satellites. The first step is triagency approval of a process for developing the requirements. This will be accomplished by June 1994. Simultaneously, the agencies will develop the Integrated Operational Requirements Document. This document should be in initial agency review and comment by June 1994. The three agencies will also formalize their membership for the Joint Agency Requirements Group and Joint Agency Requirements Council by Spring 1994 and begin meeting to review the IORD and support development and approval of that document.

One result of the triagency review was that NOAA and DoD concept studies proposed different technical solutions for similar observational requirements. This produced some disagreements between the existing communities as to the appropriate approach for the converged system. To overcome these difficulties, the converged system program office needs to immediately begin investigation of technical implementation trade-offs of various requirements. These studies include visible/infrared imagery, microwave soundings, and infrared soundings. Truly joint studies on these requirements implementation approaches should improve the final requirements baseline definition by improving each agency's ability to understand the other observational requirements.

FINALIZE EUROPEAN COOPERATION AGREEMENTS

In the pre-convergence plans for the follow-on operational civil system, NOAA had progressed significantly toward an

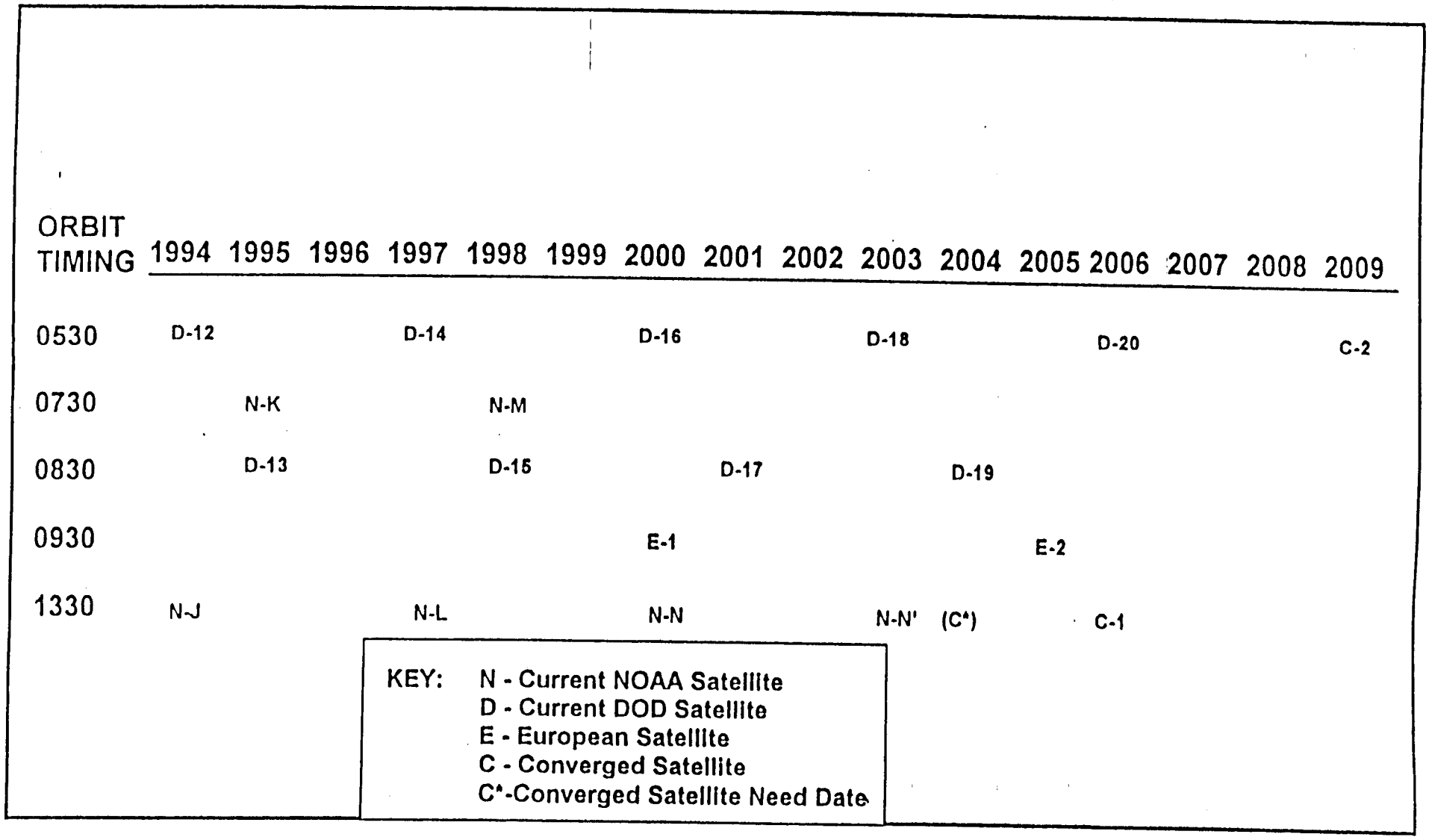


FIGURE 2. PROJECTED LAUNCH DATES

FIGURE 3. PHOGRAM SCHEDULE

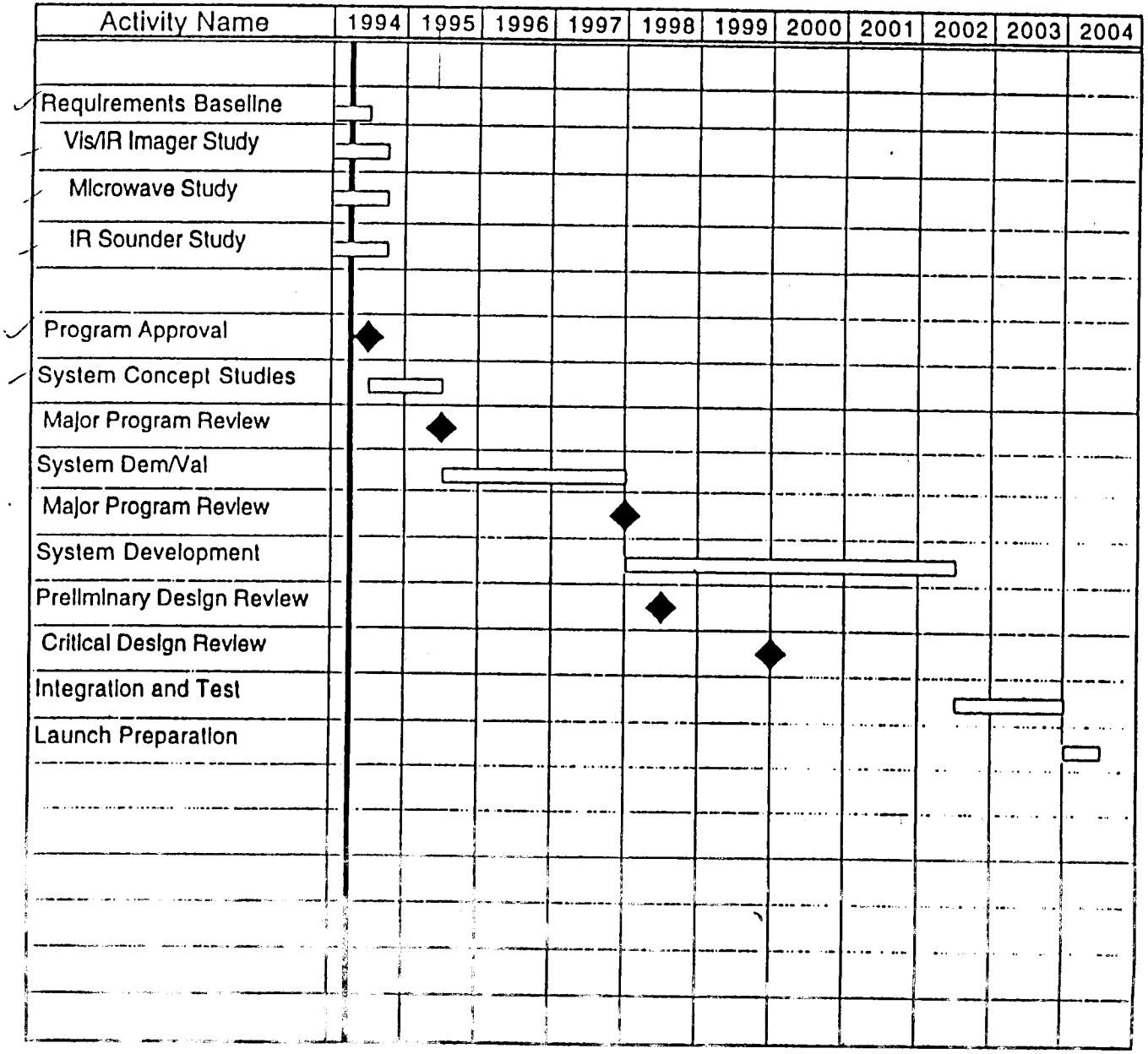
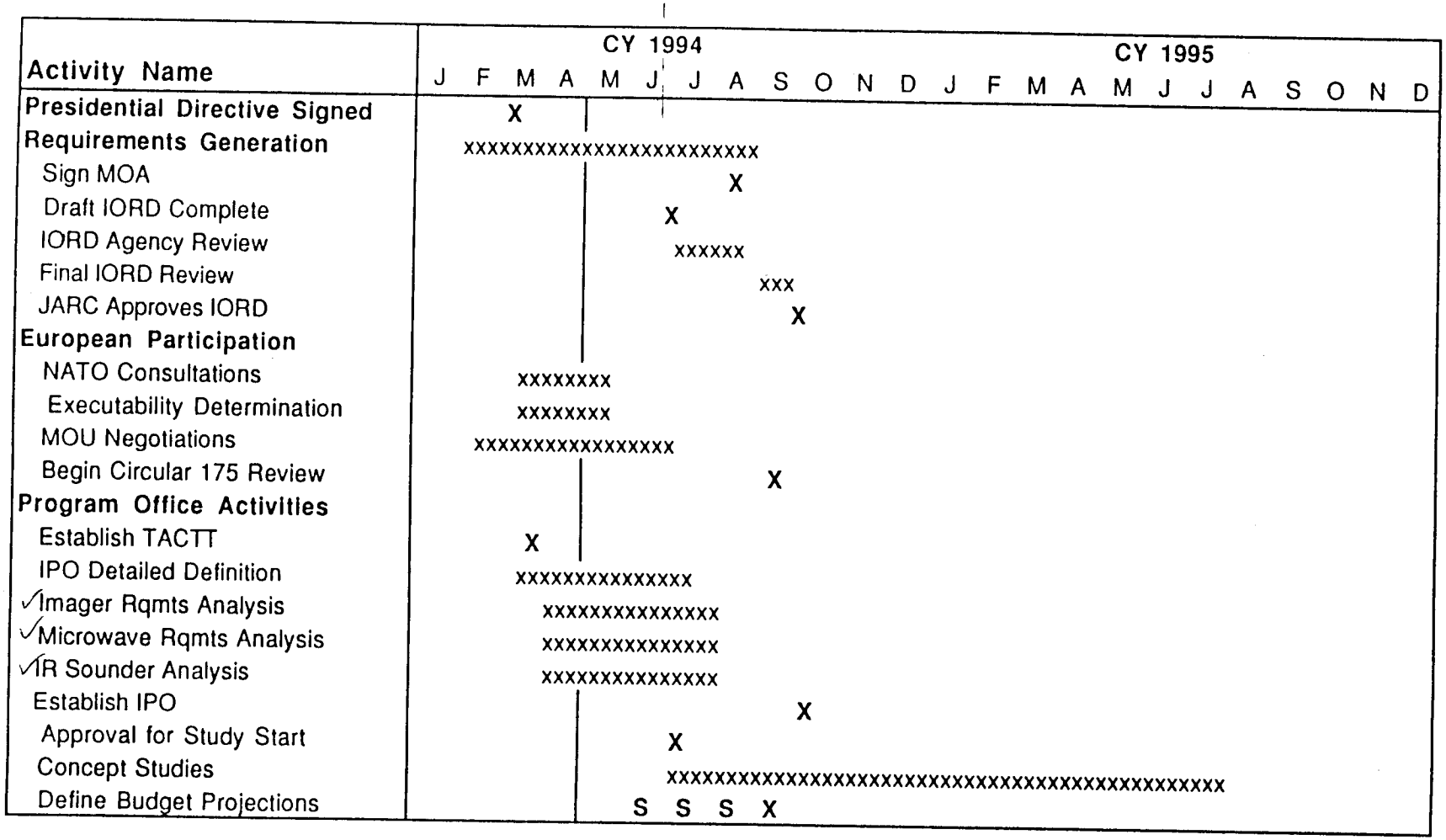


FIGURE 4. TRANSITION ACTIVITIES



S = Status
X = Complete

agreement to have EUMETSAT take over primary responsibility for the current NOAA morning mission. The convergence discussions to date have revalidated the potential cost savings of such international cooperation. However, for such an arrangement to work in a converged system, not only must NOAA rely on the EUMETSAT satellite, but now DoD must rely upon that satellite as well. The triagencies have agreed on the conditions for inclusion of the European satellite in the converged system and have initiated consultations with key U.S allied governments through the NATO Military Committee Meteorological Group and with EUMETSAT to determine the executability of these conditions. Volume II (classified) of this report details the actions, agreed by the three agencies, needed to ensure national security requirements are met if the EUMETSAT satellite is incorporated in the converged U.S. system. Key triagency activities are to address data distribution requirements with NATO member nations; determine the executability of U.S. Government conditions for European involvement; modify draft EUMETSAT Agreement with convergence changes (by June 1994), and finalize the Agreement and any other necessary government-to-government agreements relating to the details of European participation. The U.S.-EUMETSAT Agreement is planned to be ready for final Circular 175 approval within the U.S. Government by the beginning of August 1994.

INITIATION AND FURTHER DEFINITION OF THE CONVERGED PROGRAM

The agencies are intent on converging the two U.S. -operational polar meteorological satellite programs. The first major step toward this end is establishing the Integrated Program Office (IPO). The three agencies will immediately establish an Triagency Adhoc Convergence Transition Team (TACTT) to develop the plan to activate the Integrated Program Office. As a first order of business, the agencies will select the individuals to fill they key IPO positions. The TACTT will at the minimum conduct those planning activities necessary to develop MOA, locate and occupy a facility for the IPO and further define detailed management and programmatic procedures.

The Triagency Steering Committee will assemble a triagency team of experts to continue the technical definition of the converged system as well as further explore the executability of the converged system conditions with the Europeans.

VI. CONCLUSIONS

This Implementation Plan reflects the culmination of a combined triagency effort to determine the feasibility of and framework for combining the requirements and capabilities of their related programs so as to reduce the cost of these programs to the U.S. Government. In the spirit of reinventing government as inspired by the National Performance Review and the Government Reinvention Act, this group did not limit itself to reusing previous methods and approaches. Rather, the triagency convergence study group identified and analyzed previous lessons learned in search of innovative solutions that would offer the greatest probability of success.

Certain aspects of this converged program approach reflect a change in the previous perspective and thinking of the participants, who have realized it is necessary to work together to achieve related goals in a difficult financial environment. Throughout the convergence study effort, participants have found it necessary to widen their perspective beyond the specialized requirements of their own parent agency and include the related requirements of their new partners. It was only through the direct application of each participant's specialized technical knowledge and face-to-face discussion of each agency's experts that mutually acceptable solutions to this new combined set of requirements could be found. For example, issues such as national security and international cooperation were considered jointly in an effort to find solutions that would allow a greater amount of commonality among the two systems that would satisfy both sets of requirements at reduced costs.

The previous tendency to divide and delegate activities among the participants was abandoned in exchange for an triagency working environment. Since the earliest stages of the triagency convergence study, triagency teams have worked directly together on a day-to-day basis, combining their specialized expertise and experience to develop integrated solutions that were acceptable to all parties. The management approach developed for the converged program dictates this type of integrated relationship continue as the converged program is initiated, rather than delegate activities to individual participants. In this way, the specialized programmatic and technical expertise of each agency is directly applied to each problem, focused more toward working together to meet the program's set of combined requirements, and less on the previously narrow specialized perspectives of each parent agency.

Just as the triagency participants have found it necessary to integrate their operational programmatic and technical expertiseinto a Single program Office, to successfully deal with a broader range of combined agency requirements, it is essential that the other government bodies that oversee the program and approve its budget can fully appreciate the full range of triagency requirements and activities that have been merged within the converged program. For example, dividing thr review and budget approval process for the converged program among multiple organizations and committees could have a severe impact on the ability of the program to achieve its full set of integrated objectives. Oversight organizations who are traditionally familiar with only a portion of the now-combined set of requirements may not fully appreciate the importance of the expanded set of program requirements nor fully support the new, less familiar requirements. This could lead to inconqruotas budget decisions that will severely restrict the ability of the program to successfully achieve its goals, as occurred on LANDSAT-7. Therefore, as the converged program is initiated and begins to take shape, it will be important to assess how the integrated approach defined for management of the combined program could be similarly implemented in the program's oversight and budget approval process at the agency, Executive, and Congressional levels. This would involve the review of the program by groups or committees that fully support the combined national security and civil goals of the program.

The final determination of the instruments for the converged system will be dependent upon completion of the triagency requirements development process and subsequent initiation of detailed trade studies by the IPO. Therefore it is important that a JARG and an Triagency Adhoc Convergence Transition Team (TACTT) be formed immediately to initiate those planning activities, so that the full program will be rear!,, to start issuing fabrication contracts upon receiving final Congressional approval.

Just as the Vice President's National Performan, e Review and the Government Reinvention Act (H.R. 3400) call for the development and potential implementation of new ideas on how to improve overall government effectiveness, this implementation plan defines a feasible, innovative way for conducting the converged program and achieving this goal. It is only through the consideration of innovative ideas and new ways of thinking such as in this plan, that we can respond to the challenge embodied in the National Performance Review and H.R. 3400.